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10/665,083	09/16/2003	Marvin Glenn Wong	10030290-1	6080

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EXAMINER	
LAZORCIK, JASON L	
ART UNIT	PAPER NUMBER
1731	

DATE MAILED: 11/14/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

C

Office Action Summary	Application No. 10/665,083	Applicant(s) WONG, MARVIN GLENN	
	Examiner Jason L. Lazorcik	Art Unit 1731	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 September 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-24 and 29-35* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-24 and 29-35* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claim 32 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Specifically, applicants disclosure fails to provide supporting documentation for an abrading process which creates “a maximum channel depth” or wherein the microcracks formed therein exhibit “a maximum crack length”. Futher, the disclosure fails to provide support for the limitation wherein “the maximum crack length is shorter than the maximum channel depth”.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1, 2, 4-5, 7, 14-17, 20-23, 31, and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Toyoda (US 2004/0038616) in view of Case (J. Mater. Sci. 32 (1997) 3163-3175).

Toyoda relates a method for forming barrier ribs or "at least one channel" in a flat panel display substrate. As set forth in the immediate disclosure, the substrate is "sandblasted with a sandblast gun using an abrasive containing fine calcium particles, thereby removing portions of the partition wall paste, the portions not being covered with the resist pattern portion" (Page 1, ¶[0007]). Toyoda continues by indicating that irregularities are formed in the groove surface by the sandblasting process and said irregularities may be removed by heating said substrate with an impinging laser beam (page 3, ¶[0053-0054]) in order to partially melt the surface of the groove. **<u>It is therefore understood according to the teachings of Toyoda that a process for "abrading at least one channel in a substrate by ejecting particles towards the substrate" is known in the art.</u>**

Toyoda further indicates that the abrading process gives rise to deleterious "irregularities" within the abraded groove and that said irregularities may be smoothed

or healed by heating the substrate. The Toyoda reference fails to specifically identify these irregularities as "micro-cracks" in accord with applicants lexicon, however **the Toyoda utilizes a substantially equivalent manufacture process to the one set forth in the applicants disclosure**. Therefore in the absence of evidence to the contrary, it is understood that the Toyoda irregularities **are effectively equivalent to the disclosed "micro cracks and surface roughness produced by an abrading technique such as sandblasting" (pg 4, ¶[0020]) as set forth in applicants disclosure**. Further although Toyoda fails to explicitly set forth physical changes that occur to the glass substrate during the smoothing process, Case (1997) clearly lays out a detailed method for healing microcracks in glass substrates that are formed during an indentation process. Specifically, Case (1997) sets forth an investigation of crack healing in a borosilicate glass using an environmental scanning electron microscope (ESEM).

While the mode of forming the microcracks differ between the Toyoda and Case (1997) disclosures, the fundamental teachings set forth by Case relate directly to the method of healing these microcracks in a glass substrate. **It would have therefore been obvous to one of ordinary skill in the art at the time of the invention to adapt the teachings of Case (1997) with respect to healing microcracks in a glass substrate to the process of smoothing surface irregularities in the abraded channel substrate as set forth in the Toyoda process.**

Therefore with respect to Claim 1, Case (1997) discloses an experimental procedure which comprises the following steps:

1. Abrading a Vickers indent in the center of a borosilicate glass slide (§2.1 ¶1, Pg. 3164)
2. Heating the samples in a tube furnace to a temperature such that the samples are "thermally annealed " (§2.2 ¶2, pg. 3164).
3. and cooling the substrate (§2.2 ¶2, pg.3164)

In the instant case, the process of indenting the surface is understood to provide surface irregularities substantially equivalent to the "irregularities" of the Toyoda process and the applicants disclosed "microcracks" and surface roughneing. While the composition of the commercial glass substrate and therefore the softening point of said material, are not disclosed in the Case reference, the quoted temperature of 550°C is below the softening point of common commercially available borosilicate glasses of the type utilized for microscope slide applications. The Case heating step is therefore understood to treat the glass substrate at a temperature above the annealing point to induce thermal annealing, but well below the softening point of common borosilicate glasses.

Regarding claims 2, 4, and 5, Case (1997) clearly discloses that the heat treating cycle in the ESEM is to be carried out at a specified relative humidity value (§3.1 ¶2, pg 3165). Since the term relative humidity is well understood and commonly utilized to express water vapor content in air, it is hear understood that the Case (1997) heating process is carried out in an atmosphere containing water vapor, air, and specifically nitrogen gas in addition to other common components of air.

With specific regard to Claim 2, the heat treating cycle in an atmosphere of specified relative humidity as disclosed by Case (1997) reads directly on the immediate claim as heating a substrate in an environment containing a mixture of nitrogen with water vapor.

Regarding Claim 4, the heat treating cycle in an atmosphere of specified relative humidity as disclosed by Case (1997) reads directly on the immediate claim as heating a substrate in an environment containing air.

Further regarding Claim 5, the heat treating cycle in an atmosphere of specified relative humidity as disclosed by Case (1997) reads directly on the immediate claim as heating a substrate in an environment containing nitrogen gas.

Continuing with claim 7, Case (1997) clearly indicates in the Experimental Procedure (§2.1 ¶1, pg 3164) that the substrates are to be commercially available glass slides (Fisher Scientific Microscope Slides) which read on the immediate claim as a process according to Claim 1 wherein the substrate comprises glass.

Regarding Claims 14 and 15, Case (1997) presents images of pre and post heat treatment substrates as set forth in the following figure. For purposes of this discussion, the Vikers indent as highlighted by the square overlay is equivalent to the claimed macro feature while the cracks annotated by arrows are held equivalent to the claimed micro cracks. It is further understood from the images that the micro cracks emerge on the surface of the substrate resulting in a locally roughened surface.

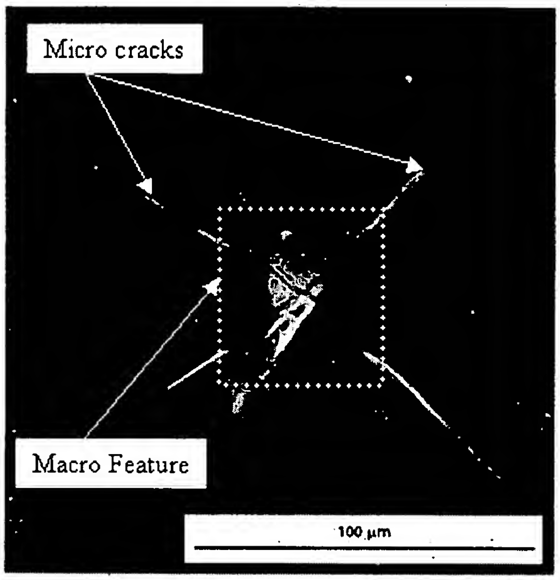

Fig. 1 Pre-heat treatment (pg3165)

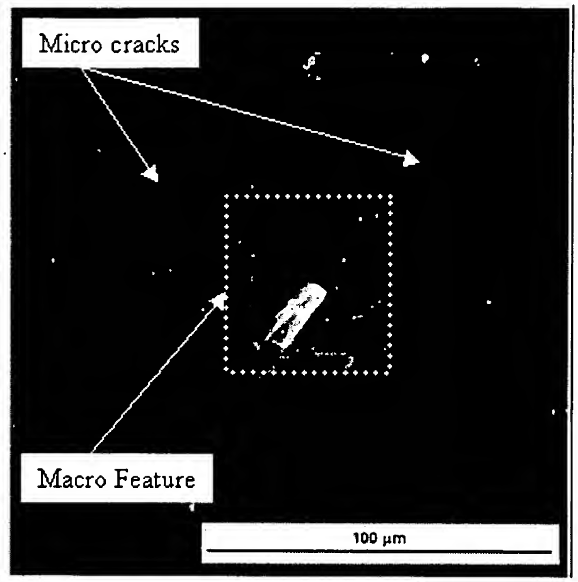

Fig. 2 Post-heat treatment (pg 3166)

Specifically in Claim 14, the assertion is made that the substrate is heated to a temperature that heals micro cracks while minimizing sagging of macro features. From the above figure, it is clear the Vikers indent (square overlay) remains relatively unchanged from pre to post heat treatment. Since said indent remains relatively unaffected from pre to post treatement, the Case (1997) anneal process is understood to "minimize sagging of the substrate". Further as also depicted above, the micro cracks (arrows) display a marked decrease in length or "healing" from the same treatment cycle. Therefore the Case (1997) anneal process is understood to heal microcracks without distorting the overall geometry of the substrate.

Further in Claim 15, it is asserted that the substrate is to be heated to a temperature that smoothes the surface of the substrate without disturbing the macro features. It is here noted that absent any clearly defined terminology relating the differences between micro and macro scale, it is the Examiners understanding that the

Vikers presents a macro-scale substrate feature in relation to the micro cracks as annotated above. Again, the Vikers indent (square overlay) remains relatively unchanged or "undisturbed" during the heat treatment cycle, while the cracks (arrows) are healed and decrease in length producing a locally smoothed surface in the healed region of the original crack.

Regarding Claim 16, Case (1997) clearly indicates in Table III (See following excerpt from page 3165) which recites experimental data in experiment gamma, that the first ESEM heat treatment cycle is to be for a period of 59.25 min (ramp 25°C to 370°C @ 20°C/min in 17.25min followed by a 15 min dwell and ramp 370°C to 430°C @ 5°C/min in 12min followed by a 15min dwell). This set of process steps clearly read on the instant claim as heating the substrate for a period of time in the range of approximately ten to one hundred and twenty minutes.

TABLE III ESEM hot stage heating schedule for specimen in experiment gama

	Set point (°C)	Ramp rate (°C min^{-1})	Dwell time (min)
1	370	20	15
2	430	5	15
3	25[a]	20[a]	[a]
4	370	20	15
5	430	10	175

[a]ESEM shut down, so specimen was cooled to room temperature and the ESEM was rebooted.

Regarding Claim 17, Toyoda and Case(1997) are silent regarding the specific orientation of the substrate during the heating and annealing processes, respectively. It would however be obvious to one of ordinary skill in the art at the time of the invention

to heat said substrate face up in order to avoid contaminating the top of the features by contact with a supporting platform. Similarly, with respect to claims 18 and 19, it would have been obvious to one of ordinary skill in the art to heat the substrate with the at least one channel facing down in order to prevent dust from settling onto the device surface. It would further have been obvious to one of ordinary skill to utilize a low porosity supporting substrate to avoid excessive marring of the device by the support during the heating schedule.

With respect to Claim 20 and referring to the Claim 16 rejection, Case (1997) in the Table III data indicates that the substrate is to be heated in hot stage heating schedule step 1 from a temperature of 25oC at a ramp rate of 20oC/min. It is understood in this context that the ESEM is held functionally equivalent to the claimed furnace. Therefore this experimental procedure reads clearly on the instant claim as heating the substrate in a furnace wherein the temperature is ramped from 25°C at a rate of about 20°C to 40°C per minute.

Similarly regarding Claim 21 and referring to the Claim 20 rejection, Case (1997) in the Table III data indicates that the substrate is to be cooled in hot stage heating schedule step 3 from a temperature of 430°C to 25°C at a ramp rate of 20°C/min. Therefore this experimental procedure reads directly on the instant claim as a process according to Claim 20 wherein the substrate is cooled to 25oC at a ramp rate of about 20°C to 40°C per minute.

With respect to Claim 22, all claimed elements have been previously anticipated by a combination of the arguments set forth in the rejections of Claims 1 and 14 above.

Specifically in the rejection of Claim 1, prior art sets forth an obvious combination of teachings wherein a substrate with abraded channels and irregularities or "microcracks" formed therein is heated to a temperature between the annealing point and the softening point of the substrate material followed by cooling said substrate. As subsequently set forth in the rejection of Claim 14, the process set forth in this combination of prior art teachings results in the healing cracks or "micro cracks" in said substrate.

Claim 23 is fully anticipated by a in light of the above rejection of Claim 22 and the rejection of Claim 2 which indicated that the thermal treatment is to be carried out in an atmosphere containing a mixture of nitrogen with water vapor.

Claims 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Toyoda (US 2004/0038616) as applied to Claim 1 above in view of Tarr (J Biomed Mater Res (Appl Biomater) 48:791-796, 1999) hereafter referred to as Tarr (1999).

The Tarr reference teaches the abrasion of a ceramic block by indenting a Vickers indent to produce an abraded channel in the ceramic block or substrate. **<u>The Vickers indent is understood to produce microcracks in the substrate that are substantially equivalent to those formed by the abrasion process taught by Toyoda as forth in the Claim 1 rejection above.</u>** Tarr (1999) continues (§ Materials and Methods; Specimin Preparation – pg 792) by annealing the abraded ceramic substrate (Cerec Vitablocs Mark II) in air at 900°C between the glass transition point [796 +/- 5oC] and the softening point [914 +/- 8°C] (see §Results; Thermal Expansion-pg 792) followed by cooling to room temperature. This set of experimental procedures

reads on claim 6 as a method of Claim 1, wherein the substrate comprises ceramic. Toshida teaches a method for abrading a channel in a substrate by ejecting particles towards the substrate which is held substantially equivalent to applicants disclosed process. Toshida further indicates that said abrasion process results in irregularities within the abraded channel. Since the Tarr process is understood to heal microcracks in a ceramic substrate, it would have been obvious to one of ordinary skill in the art at the time of the invention seeking to heal irregularities or microcracks in a ceramic substrate using the annealing process as set forth by Tarr.

Claims 3 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Toyoda (US 2004/0038616) and Case (1997) as applied to the respective claims 1/2 and 22/23 above, and further in view of Case (J. Mater. Sci. 34 (1999) 247-250) hereafter referred to as Case (1999). The prior art teaches all of the elements of Claims 1,2 and 22,23 by abrading a channel in a substrate, heating the substrate material between its annealing point and softening point in an atmosphere comprising nitrogen and water vapor, and cooling the substrate back to room temperature. Case (1997) does not teach that the concentration of water vapor in said atmosphere should lie between 10 to 25%, nor does it teach that the relative humidity in the chamber should fall approximately 5% below the saturation value.

Case (1999) examined the effect of humidity on crack healing as a function of healing temperature. In brief, it was disclosed that the temperature at which crack healing initiated shifted as a function of relative humidity (§3.1 ¶1, pg 248). Specifically

samples exposed to increasingly higher initial humidities or water vapor concentrations displayed onset of crack healing at progressively lower temperatures.

"[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation."; see In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). A particular parameter must first be recognized as a result-effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation (See In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980) and In re Antonie, 559 F.2d 618, 195 USPQ 6 (CCPA 1977)). In light of the disclosure in Case (1999) that the temperature at which crack healing initiated decreased as a function of relative humidity and therefore percentage water vapor in the atmosphere, the relative humidity is considered a result-effective variable. It would have been obvious with respect to Claim 3 and Claim 24 for one of ordinary skill in the art at the time of the invention to optimize the relative humidity in the heating chamber. Optimization of this result effective variable would have been undertaken in order to minimize the onset temperature for crack healing thereby minimizing the overall thermal stress to the sample.

Claims 8, 9, 10, and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Toyoda (US 2004/0038616) and Case (1997) as applied to claim 1/7 above, and further in view of the materials information sheet for Corning 1737 AMLCD Glass Substrate data sheet hereafter referred to as Materials Information Sheet (1737). Prior art teaches all of the elements of Claim 7 and by extension Claim 1 in forming a

channel in a substrate comprised of borosilicate glass, heating the substrate material between its annealing point and softening point, and cooling the substrate back to room temperature. Case (1997) does not teach that the substrate should be of the specific type of alkaline earth boro-aluminosilicate glass marketed by Corning under the trade name Corning 1737. The Materials Information Sheet (1737) indicates that a principle use for this formulation of glass is as a substrate for active matrix panel displays. It would have been obvious to utilize the process as set forth by Toyoda and Case (1997) in order to heal micro crack damage incurred in the fabrication of active matrix displays fabricated from Corning 1737 alkaline earth boro-aluminosilicate glass in order to improve product yield.

With respect to claims 9 and 29 and in further view of the claim 8 rejection above, the active matrix display substrate fabricated from Corning 1737 should be heated to above it's annealing point but below its softening point as taught by Case (1997). Case does not relay the particular temperature range claimed, however the Materials Information Sheet (1737) indicates an annealing point of ***721°C*** and a softening point of 975°C. It would have been obvious to one of ordinary skill attempting to heat a substrate fabricated from Corning 1737 between its annealing point and softening point to do so in a range of about 721°C to 975°C.

Claim 10 continues the argument set forth in the Claim 9 rejection above. Specifically, a combination of Case (1997) and the Corning Materials Information Sheet (1737) fully anticipate all elements of Claim 9. Case (1997) sets forth the set of experimental parameters for experiment alpha as laid out in Table I (see below) wherein

the maximum temperature is maintained for a period of 135 minutes (dwell time). This set of experimental parameters reads on the instant claim as maintaining the maximum heating temperature for at least ten minutes.

TABLE I ESEM hot stage heating schedule for specimen in experiment alpha

	Set point (°C)	Ramp rate (°C min⁻¹)	Dwell time (min)
1	300	20	5
2	400	20	10
3	500	10	20
4	550	5	30
5	600	2	135

Further, although Case (1999) does not set forth Corning 1737 as the substrate material, it does expose the empirical relationship between the dwell time at a maximum healing temperature and the resultant decrease in the crack length. This data set clearly sets forth dwell time at a given maximum temperature as a result effective variable as per the argument set forth in the Claim 3 and 24 rejections above. It would have been obvious to one of ordinary skill in the art to empirically optimize the dwell time at a maximum heating temperature in the process set forth by Case (1997) in order to minimize crack length in an active matrix display substrate made from Corning 1737.

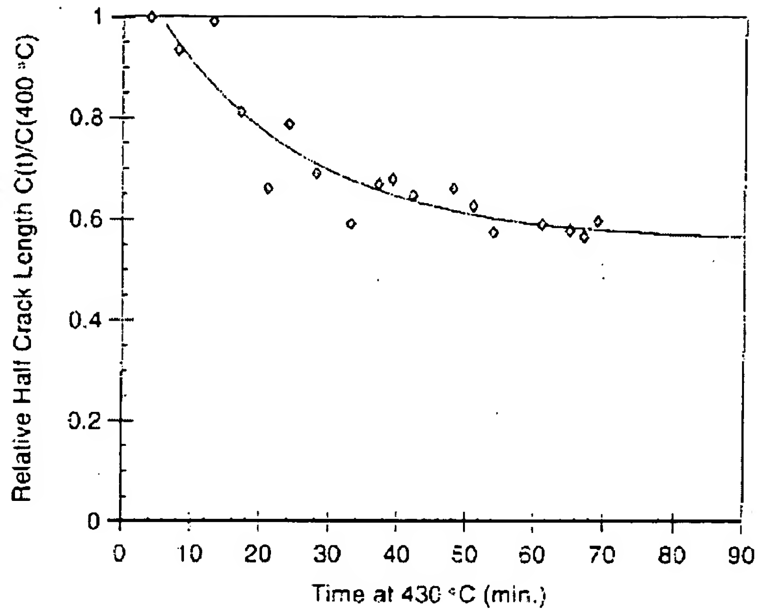

Figure 5 Relative change in crack length ($c(T)/c(400\ ^\circ C)$) as a function of time at 430 °C for a glass specimen initially held at 32% r.h. Data points indicate ESEM measurements of the four half-indent cracks. The curve is a least-squares best-fit of the data to Equation 4.

Claims 11, 12, 13, and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Toyoda (US 2004/0038616) and Case (1997) as applied to Claims 1 and 7 above, and further in view of the Corning Materials Information sheet for Pyrex 7740 Borosilicate Glass hereafter referred to Materials Information Sheet (7740).

Specifically regarding Claim 11, Case (1997) teaches all of the elements of Claim 7 and by extension Claim 1 in forming a channel in a substrate comprised of borosilicate glass, heating the substrate material between its annealing point and softening point, and cooling the substrate back to room temperature. Case (1997) does not teach that the specific composition of the borosilicate glass comprising the substrate should be of the exact type of glass marketed by Corning under the trade name Corning 7740

(Pyrex®) and described as the "industry standard" in the Materials Information Sheet (7740). It would have been obvious to one of ordinary skill in the art to substitute the "industry standard", specific composition of borosilicate glass marketed under Corning 7740 for the generic borosilicate glass described in the procedure set forth by Case (1997) to heal micro cracks in said Corning 7740 glass substrate.

With respect to claims 12 and 30and in further view of the claim 11 rejection above, prior art clearly teaches that the substrate fabricated from borosilicate glass should be heated to above it's annealing point but below its softening point. Case (1997) further sets forth at least two sets of experimental data (§3.1, Table I – experiment alpha and Table IV – experiment delta) wherein said substrate is heated to the temperatures of 600°C and 610°C. The Materials Information Sheet (7740) indicates an annealing point of 560°C and a softening point of 821°C for Corning 7740 glass. The combined teachings of Case (1997) and Materials Information Sheet (7740) would render obvious to one of ordinary skill attempting to heat a substrate fabricated from Corning 7740 between its annealing point and softening point and to do so in a range of about 560°C to 821°C.

Claim 13 continues the argument set forth in the Claim 12 rejection above. Specifically, a combination of Toyoda, Case (1997) and the Corning Materials Information sheet (7740) fully anticipate all elements of Claim 12. Toyoda and Case (1997) sets forth the set of experimental parameters for experiment alpha as laid out in Table I (see below Case) wherein the maximum temperature is maintained for a period

of 135 minutes (dwell time). This set of experimental parameters reads on the instant claim as maintaining the maximum heating temperature for at least ten minutes.

TABLE I ESEM hot stage heating schedule for specimen in experiment alpha

	Set point (°C)	Ramp rate (°C min^{-1})	Dwell time (min)
1	300	20	5
2	400	20	10
3	500	10	20
4	550	5	30
5	600	2	135

Further, although Case (1999) does not set forth Corning 7740 as the substrate material, it does expose the empirical relationship between the dwell time at a maximum healing temperature and the resultant in the crack length. Specifically an increase in the dwell time at a maximum temperature results directly in reduced crack length (see Figure) This data set clearly sets forth dwell time at a given maximum temperature as a result effective variable as per the argument set forth in the Claim 3 and 24 rejections above. It would have been obvious to one of ordinary skill in the art to empirically optimize the dwell time at a maximum heating temperature in the process set forth by Toyoda and Case (1997) in order to minimize crack length in a substrate fabricated from Corning 7740.

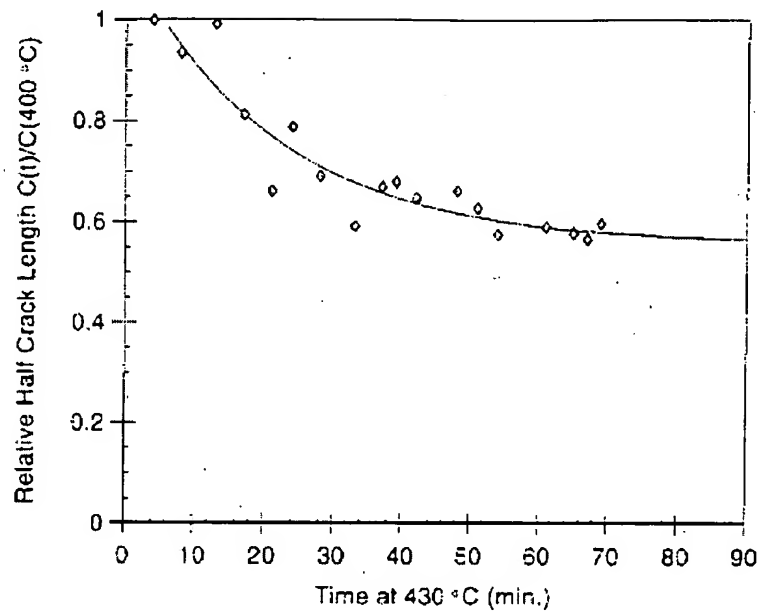

Figure 5 Relative change in crack length ($c(T)/c(400\,^{\circ}\mathrm{C})$) as a function of time at 430 °C for a glass specimen initially held at 32% r.h. Data points indicate ESEM measurements of the four half-indent cracks. The curve is a least-squares best-fit of the data to Equation 4.

<u>New Claims</u>

Claims 29 and 30, are rejected under 35 USC 103(a) as being obvious for the reasons set forth in claims 9 and 13, respectively.

Claims 31 and 33 are obvious in light of the rejection of Claim 1 under 35 USC 103(a) as set forth above.

Claims 34 and 35 are rejected as obvious under 35 USC 103(a) in light of the combined evidence as set forth in the rejections of Claim 1, Claim 14, and Claim 15 above.

Response to Arguments

Applicant's arguments with respect to claims 1-24 have been considered but are moot in view of the new ground(s) of rejection.

Applicant's reply dated September 18, 2006 noted the following clerical typographical errors and inadvertent omissions:

1) Examiner indicated the annealing point of Corning 1737 of 172oC on page 11 of the Office Action dated June 21, 2006. The correct annealing point is 721oC as indicated by applicant

2) Examiner failed to include a copy of Zworykin, ASTM Bull 117, 15-23 (1942a) Zworykin (1942) or to include said reference on the Notice of References Cited (Form PTO-892) in the Office Action dated June 21, 2006. Although the grounds of the rejection have been altered in the immediate Office Action, a copy of said reference has been included in order to clarify the record.

3) Examiner incorrectly labeled the rejection of Claim 19 under 35USC 103(a) in the Office Action dated June 21, 2006. In accord with applicants remarks, the rejection of Claim 18 from page 19, line 7 through 20, line 10 in the identified Office Action should have been labeled as the rejection of Claim 19.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason L. Lazorcik whose telephone number is (571) 272-2217. The examiner can normally be reached on Monday through Friday 8:30 am to 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven Griffin can be reached on (571) 272-1189. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JLL

Dionne W. Mayes
DIONNE ~~A. WALLS~~ MAYES
PRIMARY EXAMINER